



COUNCIL AGENDA: 05-22-12  
ITEM: 6.2

# Memorandum

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**TO:** HONORABLE MAYOR AND  
CITY COUNCIL

**FROM:** Dennis Hawkins, CMC  
City Clerk

**SUBJECT:** SEE BELOW

**DATE:** 5-9-12

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**SUBJECT: LED STREETLIGHT CONVERSION PROGRAM**

**RECOMMENDATION**

As recommended by the Transportation and Environment Committee on May 7, 2012 and outlined in the attached memo previously submitted to the Transportation and Environment Committee, accept the status report on current implementation of the adaptive LED streetlight conversion program and provide input to staff on policy options for future conversion efforts.



# Memorandum

**TO:** TRANSPORTATION AND  
ENVIRONMENT COMMITTEE

**FROM:** Hans F. Larsen

**SUBJECT:** LED STREETLIGHT  
CONVERSION PROGRAM

**DATE:** 04-18-12

Approved

Date

4/27/12

## RECOMMENDATION

1. Accept status report on current implementation of adaptive LED streetlight conversion program.
2. Provide input to staff on policy options for future conversion efforts.

## BACKGROUND

San Jose's *Green Vision* includes a commitment to convert all of the City's 62,000 streetlights to "smart," energy-efficient, adaptable streetlights. While other cities around the nation have been testing and deploying "basic" LED streetlights, San Jose has been pursuing the development of "smart" adaptable streetlights -- streetlights equipped with a remote monitoring and adaptive control system. The approach is viewed by industry experts as the next major efficiency leap in outdoor lighting.

Installing a "smart" LED streetlight system is allowing the City to reap all of the benefits of shifting to a more energy-efficient, long-lasting, broad-spectrum (white) light, as well as gain the ability to: 1) modulate its lighting levels in relation to activity on its streets, thereby reducing wasted light and protecting Lick Observatory's ability to conduct astronomical research; 2) manage its streetlights more effectively and ultimately provide better service by getting precise, timely notice of streetlight outages (as well as day burners) and warnings about systemic problems, such as copper wire theft; and 3) enable the City to be billed for the amount of energy it actually consumes based on data collected by its control system.

In pursuing smart, adaptable streetlights, the City has become a national and international leader on next generation streetlight technology, policy and practice. Some of the City's accomplishments to date are summarized in Attachment 1.

The purpose of this memorandum is to recap the status of the City's current conversion efforts and consider policy options for future conversions.

## ANALYSIS

### Status of Current Streetlight Conversions

The City is in the process of replacing approximately 2,100 of its existing Low Pressure Sodium (LPS) streetlights with adaptive "smart" LED streetlights (lights equipped with a monitoring and control system). The project is being supported by \$2,900,000 in federal funds provided by the American Recovery and Reinvestment Act (ARRA) and Community Development Block Grant programs. The targeted streetlights are located on major street corridors throughout the City. All of the new streetlights and control system components will be installed by late summer.

In addition, the City anticipates another 1,100 lights will be retrofitted as part of various planned public and private projects. Together with 315 LED streetlights installed through a series of demonstration projects, in a few years time the City will have converted approximately 3,500 smart LED streetlights in total -- about 6% of the City's streetlights. Approximately 58,500 remain to be converted. Attachment 2 provides a map showing where conversions have occurred or are planned.

### Assessments of Future Conversions

The City's 62,000 streetlights can be grouped into four major categories: Major Streets, Downtown, Local/Neighborhood Streets, and Ornamental/Pedestrian Lights. An assessment of these streetlight groupings is provided in the discussion below and on the attached chart (Attachment 3). A significant evaluation factor for future streetlight conversions is the determination of whether the energy and maintenance savings of new LED streetlights can offset the cost of the lights.

Considering solely the annual energy savings, it would take the City approximately 16 years to pay off the cost of the conversion for lights on major streets -- six years beyond the 10-year expected life of the fixture. The payoff period for local/neighborhood streetlights is 22 years. These are conservative estimates. There is good reason to expect that the lights will last longer, particularly if they are dimmed, even modestly. And, the calculation does not include the control rebate or savings from dimming, since there is no guarantee that the PG&E tariff pilot will be extended beyond the three-years of the pilot.

In addition, the conversions will result in maintenance efficiencies and have the potential to reduce maintenance staffing costs. However, the consideration of staff reductions is not recommended until at least the majority of the streetlights are converted. In the meantime, maintenance efficiencies from initial conversion efforts will allow staff to improve upon current service levels for addressing outages and wire theft.

Other cities have been able to make conversions work financially because they are typically replacing high pressure sodium (HPS) with LEDs. HPS is much less energy efficient than LPS. That is one of the reasons, along with protecting Lick Observatory, why San José chose LPS

when it converted to sodium vapor lights in the early 1980s. But that efficiency undermines the financial case for conversion now. Adding a control system makes the payback even longer.

With a payback period of 16 to 22 years for most of the city streetlights, from a conservative financial perspective the conversion does not generate a return on investment. But there are other factors to consider in determining when and where to convert the City's lights, such as safety and service. Converting streetlights on San José's major streets would improve the quality of lighting on roadways with the highest crash rates. It would also enhance the City's ability to manage its lights, including responding to outages and systemic problems, such as copper wire theft.

- Major Streets - There are approximately 20,000 streetlights on the City's Major Streets, not counting those that are or will be converted through other means. The cost to convert these streetlights is approximately \$17 million, including a \$1.8 million streetlight rebate from PG&E. The City is also eligible for a calculated rebate for its control system, but the amount will not be known until the grant-funded 2,100 streetlight conversion is completed.
- Downtown - There are approximately 1,600 streetlights in Downtown San Jose. The vast majority of these lights are high-wattage and HPS. However, at this point in the development of LED lights, higher wattage fixtures are more expensive and less energy efficient than lower wattage ones. What is more, since white light appears brighter than the pink-colored HPS, the City may be able to use a lower wattage LED replacement and achieve equal or better lighting downtown. Staff is in the process of testing one potential lower wattage LED replacement. The other complicating factor is that there are a number of ornamental pedestrian lights downtown. These lights are very expensive to replace with LED lights. The timing for converting the downtown will likely depend on the outcome of the City's downtown lighting pilot and how quickly the efficiency and cost of ornamental lights advances.
- Local/Neighborhood Streets - Numerically, the largest streetlight category is the City's residential lights. The City has more than 30,000 low-wattage streetlights in its residential neighborhoods. These lights are extremely energy efficient, making the payoff for converting them approximately 22 years.
- Ornamental/Pedestrian Lights - There are approximately 6,000 pedestrian/ornamental lights in use around the City. In some instances they augment streetlights. In other instances they serve as a roadway light. The current price for LED versions of these "special" lights is very high. It may make sense to wait for the market for these products to grow, and price decline, before converting these lights.

#### Policy Directions for Future Streetlight Conversions

Below are four policy considerations the Committee may want to consider to advance the LED streetlight conversion program.

1. Establish Priorities - Given the magnitude of the conversion effort in terms of size and cost, the City will likely need to prioritize the order in which it will convert its various categories of streetlights. For the reasons stated above, staff suggests the City convert its streetlights in the following order: 1) Major Streets; 2) Downtown; 3) Local/Neighborhood Streets; 4) Ornamental/Pedestrian Lights.
2. Explore Private Financing - During City Council's discussion of the 2011 Green Vision Annual Report and 2012 Work Plan at its March 20<sup>th</sup> meeting, staff was directed to investigate the possibility of accelerating streetlight conversions by securing private financing for a combination of streetlight conversions and energy efficiency improvements in City buildings. If the anticipated savings from the building improvements are large enough, they could help make a combined package more attractive for private financing. Staff will report back to the Committee as more details on this strategy are developed.
3. Consider LED Streetlight Conversion Funding as Part of a Potential Future City Ballot Measure - In accordance with prior Council direction, staff is evaluating revenue options for a potential ballot measure in November 2012. Funding for LED streetlight conversions is being evaluated as part of a potential infrastructure bond measure.
4. Integrate LED Streetlight Conversion with Development Projects, Grant Applications and Other Capitol Improvements - Wherever feasible, the City could integrate streetlight conversions into its development and grant projects. For example, converting streetlights on roadways where bicycle improvements are planned.

## COORDINATION

This memo has been coordinated with the City Attorney's Office.

/s/

HANS F. LARSEN  
Director of Transportation

For questions please contact Amy Olay, Senior Engineer, 975-3283 or Laura Stuchinsky, DOT Sustainability Officer, at 975-3226.

Attachments

## A History of Innovation: San Jose's "Smart" LED Streetlight Conversion Initiative

San Jose's *Green Vision* includes a commitment to convert all of the City's 62,000 streetlights to "smart," energy-efficient, adaptable streetlights. To achieve that ambitious goal, and protect Lick Observatory, San Jose has had to innovate. While other cities are converting their streetlights to LEDs, San Jose is pursuing the development of "smart" adaptable streetlights – widely considered the next major advance in streetlight energy efficiency. In pursuing this goal, the City has become a national and international leader on next generation streetlight technology, policy and practice.

### Policy

- City Policy - In 2008, and again in 2010, the City revised its Public Streetlight Policy to facilitate innovation, permitting the use of emerging technologies that could help meet the City's environmental and lighting goals and permitting the use of adaptive lighting, supported by the adoption of a *Public Streetlight Design Guide*.
- Public Streetlight Design Guide - In 2010, the City adopted its *Public Streetlight Design Guide*, which provides guidance on converting the City's existing and installing new Light Emitting Diode (LED) streetlights, as well as where, how and when the City may vary its lighting levels. San Jose is the first City in the nation to adopt adaptive lighting design guidelines.

### Technology

- Pioneering "Smart" Streetlights – Since 2008, the City has carried out a demonstration partnership, executed a series of pilot projects, and organized a streetlight demonstration and study attended by more than 100 residents, all of which has facilitated the City's efforts to advance its streetlight goals. That effort resulted in, among other things, the development of a new specification for purchasing "smart" streetlights, identifying a method for capturing the energy savings from dimming, and developing guidelines for installing, replacing and operating its lights. As a result of San Jose's leadership in this area, staff has been asked to speak at numerous conferences, including one in China, about the City's goals, findings, and strategies.
- Municipal Solid-State Street Lighting Consortium (MSSLC) – As a result of this work, in 2010 staff was asked to chair the MSSLC's committee on remote monitoring and adaptive control systems. That committee is developing a model control specification based on the City's specification. The Consortium also asked the City to host one of seven workshops MSSLC organized around the nation in 2010-2011. San Jose's smart streetlight conversion program was featured at workshop.

### Implementation

- Adaptable Streetlight Tariff – In September 2011, the California Public Utility Commission approved PG&E's limited pilot program for networked-controlled dimmable streetlights. The City will be participating in the three-year pilot, which it helped negotiate with the California City-County Street Light Association and the City of Oakland. The pilot will allow PG&E to bill the City for its actual energy usage as reported by its streetlight control system. If the pilot is successful, a permanent adaptive streetlight tariff may follow.

# LED Streetlight Conversion Program

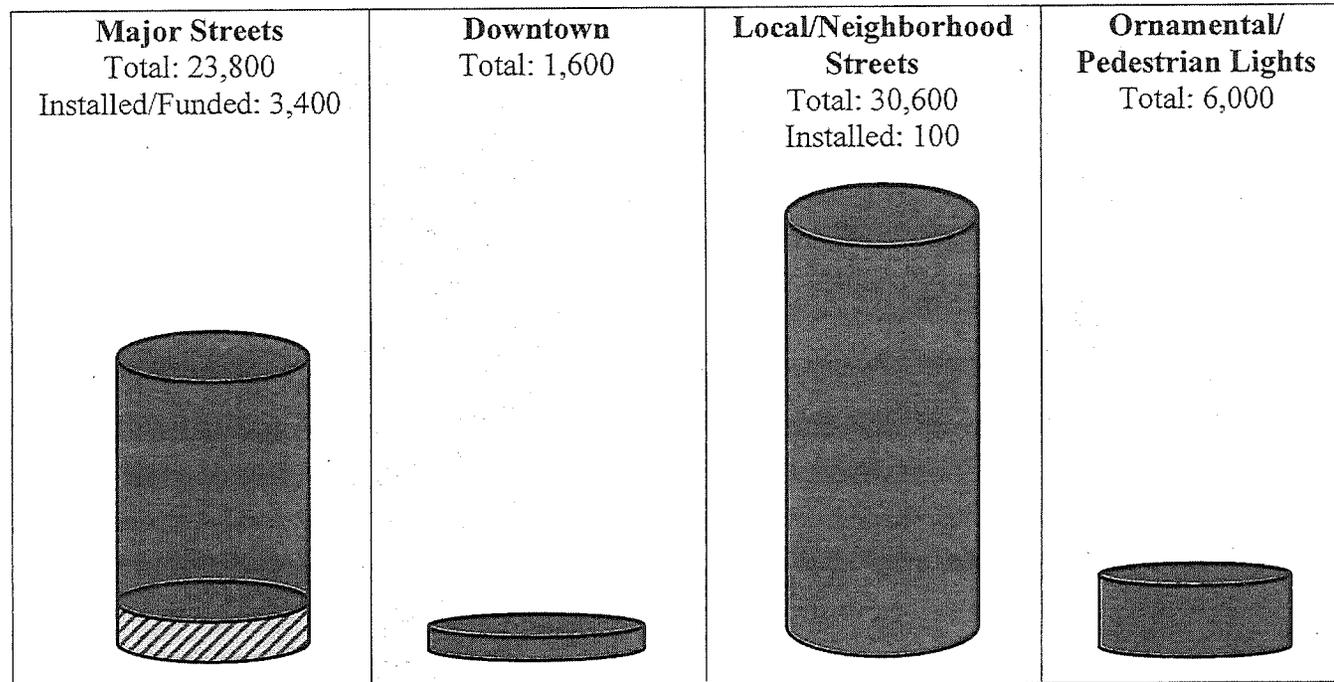


## Legend

### Conversion Status

- Completed To Date
- Remaining 2012 Grant Funded
- ..... Other Active Projects

**Smart LED Streetlight Conversion Program**  
(62,000 lights; 3,500 installed or funded)



					Total
Number to Convert	20,400	1,600	30,500	6,000	58,500
Primary Existing Wattages	90w and 135w LPS	250w and 400w HPS	55w LPS	150w HPS	
Conversion Cost	\$17 million	TBD	\$21 million	\$19 million	
Rebate (streetlights only)	\$1.8 million	TBD	\$1.5 million	\$590,000	
Annual Energy Savings	\$800,000	TBD	\$625,000	\$230,000	
Bulb Replacement Cycle (Current)	2 to 4 years	2 to 4 years	4 to 5 years	4 to 5 years	
Effectiveness	High	Potentially Very High	Medium	Low	
Issues		Studying illumination level for replacements		Cost of replacement lights is very high	